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EC23-122 Sweet Clover in Nebraska

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THE UNIVERSITY OF NEBRASKA
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Sweet Clover in Nebraska

A first year sweet clover pasture in Eastern Nebraska.

UNITED STATES
DEPARTMENT OF AGRICULTURE
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FACTS WORTH KNOWING ABOUT SWEET CLOVER

Sweet clover can be grown in practically all parts of the state. Good stands of sweet clover can sometimes be secured where red clover and alfalfa will fail entirely or do poorly.

Sweet clover is best adapted for pasture and soil building purposes. It may be used for hay under conditions where red clover and alfalfa can not be successfully or easily grown.

Hulled and scarified sweet clover seed is ordinarily sown at the rate of from 15 to 20 pounds per acre. Unhulled seed should be sown at from 5 to 10 pounds heavier. Sweet clover seed which will not absorb water and germinate during the normal period is known as "hard seed" and may be present to the extent of 75 per cent or more. "Scarified" seed is that which has been run thru a machine designed to scratch the seed coat thereby allowing the moisture to be absorbed.

Stock soon learn to like sweet clover and do well on it. It will make more feed per acre than the common permanent pastures.

Sweet clover is a rapid soil builder. It is an excellent crop to seed on thin run down land. Being a two year plant or biennial, it works into a rotation better than alfalfa.

The white blossom, biennial sweet clover is most commonly grown, although the yellow blossom variety is preferred by some.

Seeding sweet clover without a nurse crop on a firm seed bed prepared as soon as ground can be worked in the spring, gives a greater assurance of success than any other method.

Seeding sweet clover with a nurse crop is not apt to be successful except in the northeastern and Missouri river counties or under irrigation.

Seeding sweet clover on disked corn land is a common practice. If the land is plowed it should be firmly packed before seeding. More failures have resulted from seeding on a loose seed bed than from any other cultural practice.

SWEET CLOVER IN NEBRASKA[1]

By

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Sweet clover is adapted to practically all parts of Nebraska. It will grow under a wide range of soil and climatic conditions and is found growing wild in almost all sections of the state. It grows luxuriantly in eastern Nebraska and also does well in the western part of the state. Sweet clover will grow in regions of less rainfall than will red clover and, under certain conditions, it will do well where alfalfa is not easily grown. The difficulty of establishing a good stand is probably the greatest drawback to sweet clover production on the drier lands of western Nebraska. This may be partially overcome by careful preparation of the seed bed and seeding at the proper time.

Sweet clover will grow under a wide variety of soil conditions. It does best on soils high in lime content which accounts for the fact that it sometimes makes its best growth on the points of hills where the surface soil has washed exposing a subsoil especially rich in lime. It does well on eroded run-down soils, and in sub-irrigated valleys, and often makes good pasture and hay on very sandy soils.

SWEET CLOVER FOR PASTURE

The most important use of sweet clover with the possible exception of soil improvement is that of pasture. Reports from farmers indicate that, on the average, it will carry considerably more stock per acre than will other tame or native pastures excepting, possibly, red clover and alfalfa. The fact that these two crops are dangerous to use on account of causing bloat in cattle and sheep makes them less desirable for grazing purposes. Sweet clover has been known to cause bloat. A few cases have been reported where animals died. In many cases the loss has apparently been due either to a mixture of alfalfa in the sweet clover or to the fact that very hungry stock were turned on the clover when it was wet with rain or dew.

[1]This circular is largely based on questionnaire replies received from more than 200 farmers growing sweet clover in all parts of the state and on personal observations of and experiences with the crop in various counties.

It is often said that stock will not eat sweet clover readily, but, with more knowledge in handling the crop, this complaint is much less common. Most farmers who have tried it as a pasture are enthusiastically in favor of it. The cumarin which makes sweet clover bitter, tends to increase in amount as the plants get older. The young shoots contain very little of it and for this reason, together with their greater succulence they are preferred by stock. If the stock are turned on early in the spring when little cumarin is present there will be no difficulty in getting them to eat it. A few farmers have reported that cattle will leave other pastures for the sweet clover, once they are accustomed to it.

FIG. 1.—Sheep on sweet clover pasture in Saunders County.

Pasturing the First Year. In eastern Nebraska, when sweet clover is seeded with a nurse crop, it generally affords some pasture after harvest. The shocks of the nurse crop should be removed as soon as possible as they will smother and kill the clover beneath them if left for a considerable length of time.

Sweet clover sown without a nurse crop may ordinarily be pastured much sooner than that seeded with a nurse crop, depending on the time of seeding, weather, and soil conditions. In eastern Nebraska, sweet clover, seeded alone, the latter part of March or the first of April is often ready to pasture by June 1. It should be allowed to make a growth of 10 to 12 inches before stock is turned on it. Pasturing earlier than

this is likely to uproot many of the plants or so impoverish the roots that the plants may become weakened or die. The amount of pasturing must be governed by the rate of growth of the plants but after they are once established there seems to be little danger of killing them by close grazing. The first year sweet clover will continue its growth until late in the fall and often furnishes pasture until freezing weather.

Pasturing the Second Year. Sweet clover begins its growth very early in the spring of the second year and may be pastured as soon as it is tall enough to furnish a good bite. Later in the second season somewhat more care must be exercised in pasturing it. If pastured too closely it may be killed out, while if not pastured closely enough the growth becomes woody and less palatable. In order to keep the sweet clover at the proper height it may be necessary to vary the number of stock on the pasture or to use the mower occasionally to keep the growth down. If the mower is used the sickle bar should be set several inches high. A few farmers practice alternate pasturing by dividing the field with a fence, one half being allowed to get a start while the other is being pastured. It may be necessary, however, to clip with a mower even with this practice.

Another method used is to pasture sweet clover alternately with another kind of pasture such as sudan grass, blue grass, or native pasture. This method works very well, as the sweet clover can be pastured sufficiently to keep it down while the other pasture may be allowed to make as much growth as possible. A few men have reported that cattle do not relish the sweet clover under this system but the experience of many others indicates that this is not a serious factor. After one has had experience with the crop, he should be able to judge as to the number of acres it will take to carry his stock and fence off any surplus for hay and seed purposes or as a supplementary pasture during the hot and dry part of the summer, after a hay crop has been secured. The growth of sweet clover is often small the latter part of the second season and, for this reason, it is well to have a field of first year sweet clover which can be pastured at this time.

Sweet clover, being a biennial, dies at the end of the second season. Experience has shown, however, that a sweet clover field will often continue to make good pasture for a number of years. This is probably due to the fact that some of the seed which was first sown did not germinate until the second year and this, together with natural reseeding with seed produced by the growing plants, makes a more or less permanent

pasture. It is generally advisable, however, from the standpoint of fertility, to reseed a new field rather than leave a field in sweet clover more than two years. Where a field, by reason of its location, topography, or poor soil is to be left in sweet clover for more than two years, plowing and reseeding will probably be more satisfactory than allowing the sweet clover to reseed itself, which is somewhat uncertain and may result in an uneven stand. Fields which are to be left more than two years may be seeded two years in succession, the purpose being to have both first and second year plants the second season. The younger plants, together with new plants just coming on, will live over and make pasture the third year.

Sweet Clover as a Soil Builder. Sweet clover is a very valuable crop for soil improvement. Many farmers claim that it is more satisfactory for this purpose than either red clover or alfalfa. It fits into the rotation system better than alfalfa and will probably improve the productivity of the soil in a shorter time. The roots of sweet clover are large and vigorous and decay very rapidly at the end of the second year's growth. Not only does this crop add much organic matter to the soil but, in common with other legumes, it has the power of fixing atmospheric nitrogen by means of the nitrogen gathering bacteria in the nodules on the roots. The large and vigorous root system is very important on soils which have a heavy impervious subsoil or hardpan so near the surface as to interfere in crop production. The sweet clover roots are able to penetrate such soils and upon decaying leave openings which facilitate drainage and aeration and improve the physical condition of the soil. One of the important uses of sweet clover is that of reclaiming alkali soil along river bottoms particularly in the Platte Valley.

The addition of organic matter to soil by sweet clover also tends to prevent soil washing as the water holding capacity of the soil is increased, and it is kept open and porous for the absorption of precipitation. In many hilly sections of the state this is a very important factor and one which should not be lost sight of when considering the growing of sweet clover. On badly washed fields where grain crops have made unsatisfactory yields sweet clover is an excellent crop to grow. Soils in fields that have been in sweet clover are noticeably loose, and easily worked.

In the eastern part of the state, one of the common methods of soil improvement by the use of sweet clover is that of seed-

ing on winter wheat in the winter or early spring, or with oats or barley in the spring. The sweet clover is used for late summer and fall pasture the first year and in the early spring of the following year, and is then plowed and planted to corn.

SWEET CLOVER FOR HAY

The use of sweet clover for hay has not been as common or as universally successful as for pasture purposes. It may be successfully used for this purpose, however, particularly where alfalfa and red clover are not easily grown. The tendency to steminess and woodiness, the loss of the leaves, which are the most nutritious part of the hay, and the difficulty of curing are the main problems which must be dealt with.

Handling the First Year Hay Crop. There is much less difficulty in handling the first year crop than the second. The stems are finer and more leafy and the hay can be handled in much the same manner as alfalfa. Sweet clover takes somewhat longer to cure and has a greater tendency to lose its leaves than alfalfa. Stems from which the leaves have shattered will take somewhat longer to cure than those on which the leaves are retained for a considerable period in a green condition. Raking the hay before it is completely dry is regarded as a good practice as this will tend to prolong the period during which the leaves may draw the moisture from the stems. Considerable sap may still be in the stems when the hay is stacked without any bad results, but no external moisture should be present as this is apt to cause molding and excessive heating. Sweet clover hay that is stacked somewhat green is likely to turn brown in the stack. Several farmers have reported, however, that stock relish the hay in this condition as well as hay that has a greener color. The time of cutting the first year crop will depend on the amount of growth. It should be cut at the time when the greatest amount of hay will be obtained without letting it get stemmy.

Handling the Second Year Hay Crop. The difficulties in handling second year sweet clover for hay are due to the danger of killing the crop by mowing, tendency to steminess, and difficulty of curing. Where the stand is thin, the stems grow coarse and there is more of a tendency to branch out. A thick stand on the other hand is more like alfalfa and can be handled in much the same way. The second year sweet clover should be cut before it starts to bloom, or even before any flower buds appear. It may be well to cut for hay when the

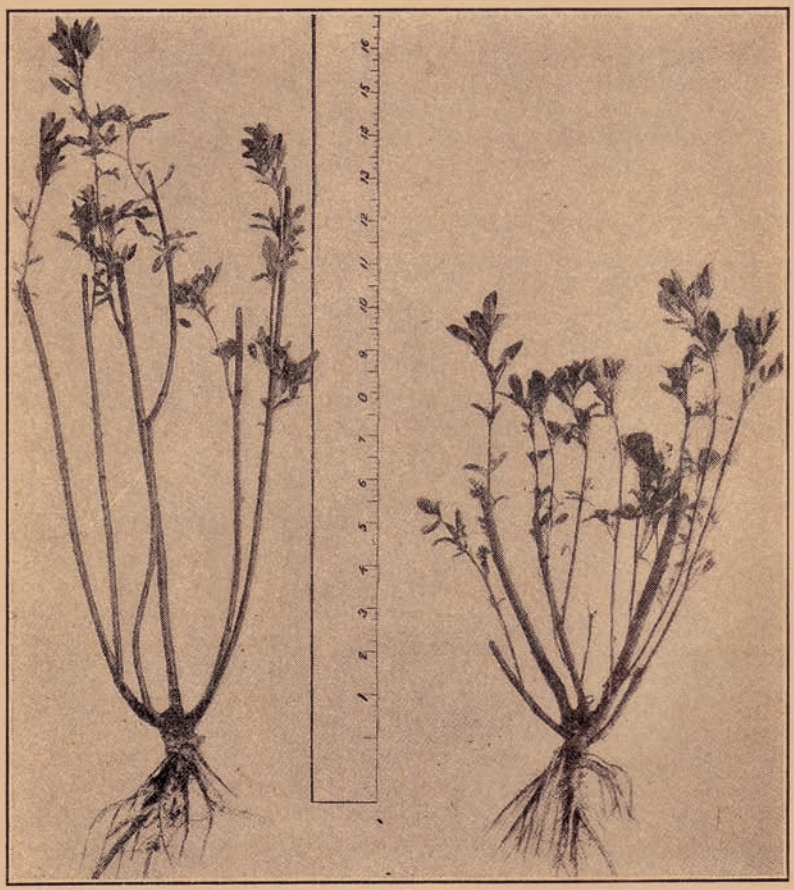

FIG. 2.—The sweet clover plant at the left was cut ten days later than the one on the right. Note the height at which it was necessary to cut this plant so that a second crop would develop. When the stand is thin the lower buds will survive as they did on the plant at the right, even though it is cut late. From U. S. D. A.

crop is about 30 inches high, rather than to wait for flower buds to appear. The two main advantages of early cutting are that the stems will be finer and less woody and the crop will not need to be cut quite so high as it would if cut later. Unlike alfalfa sweet clover does not send up new shoots from the crown after it has attained considerable growth the second year, but new growth is from buds on the side of the stems. In cutting for hay, it is therefore necessary to mow the crop high enough to leave plenty of live buds for a new crop. Usually the thicker the stand the higher the crop should be mowed in order not to kill it, as the lower buds will be smothered by the heavy growth. A second cutting of hay may be secured but generally it is not as good quality as the first cutting, due to the tendency of the plants to become woody and set seed. A common practice is to let the second crop go for seed or to use it for pasture.

Feeding Value of Sweet Clover Hay. Chemical analyses show that a good quality of sweet clover hay has about the same feeding value as alfalfa or red clover. However, due to the larger stems, there is usually more waste from the sweet clover hay than from red clover or alfalfa. The following table gives the composition of sweet clover hay as compared to alfalfa, red clover and soybean hay.

TABLE 1—*Composition of Sweet Clover Compared to Other Legume Hay.*

Kind of Hay	Percent of Water	Percent of Ash	Percent of Protein	Percent of Fiber	Percent of Carbohydrates	Percent of Fat
(1) Sweet Clover leaves	8.70	10.92	28.20	9.28	39.78	3.09
(1) Sweet Clover stems	8.70	8.08	10.16	39.45	33.08	.70
(2) Sweet Clover	8.6	7.2	14.5	27.4	40.1	2.2
(2) Alfalfa	8.6	8.6	14.9	28.3	37.3	2.3
(2) Soy bean	8.6	8.6	16.0	24.9	39.1	2.8
(2) Red Clover	12.9	7.1	12.8	25.5	38.7	3.1

(1) Bureau of Chemistry, Washington, D. C.
(2) From Henry and Morrison.

It is readily apparent from Table 1, that the greater value of sweet clover hay is in the leaves, and this should be kept in mind in handling the crop. The experience of many farmers who have used sweet clover for hay indicates that the palatability of first quality hay is good. The cumarin, which is present in the plant and which imparts a bitter taste, is mostly

lost if the hay is properly cured. Early cut hay has less of this substance than older and more woody material thus making it doubly imperative that the hay be cut at an early stage of its growth.

THE SEED CROP

Reports from more than one hundred farmers indicate that the yield of sweet clover seed ranges from two to fourteen bushels with an average of about five bushels per acre. The harvesting of a crop of sweet clover seed is more difficult than that of other legumes, as the plants are generally so large and bushy that they are difficult to handle and the seed shatters easily. It is practically impossible to save all of the

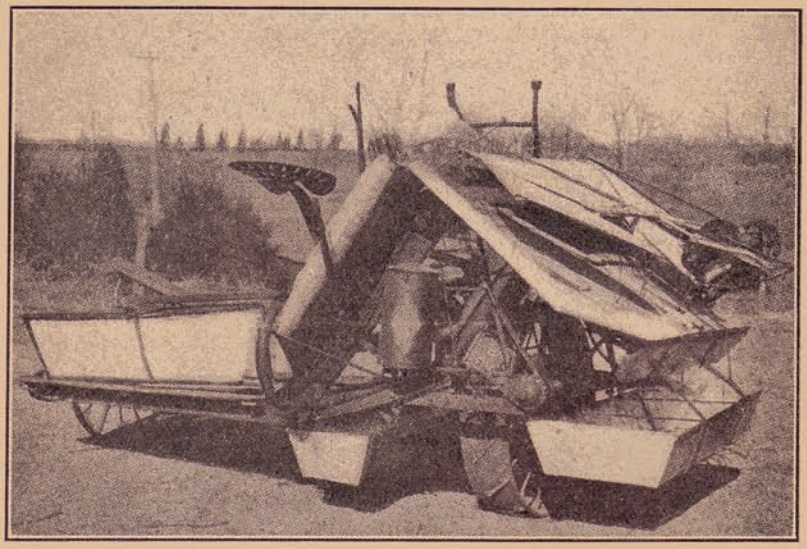

FIG. 3.—A grain binder equipped with pans and extensions to the rear elevator plate and binder deck to save the sweet clover seed which is shattered while cutting the crop. From U. S. D. A.

seed as it ripens so unevenly. The same plant may contain flowers, partially formed seed, and fully ripe seed at the same time. The time selected for harvesting should be when the largest amount of seed is present or when about three-fourths of the pods have turned brown. Harvesting is usually done with the ordinary grain binder but sometimes the corn binder is used.

Unless the first crop of the second year is cut for hay or pastured the first part of the season, the sweet clover—particularly the white blossomed variety—is likely to grow so rank that it cannot be easily handled with a grain binder. The use of the grain binder affords an opportunity to save more of the shattered seed than does the corn binder. A long wooden or metal pan can be placed beneath the binder where the platform and elevator canvasses meet and a large quantity of the seed will be saved that would otherwise fall to the ground. In a like manner, pans places at other points as under the packers of the binder, will save considerable seed.[1]

Cutting the clover when slightly damp will help to eliminate much of the shattering. If the binder is used, the clover should be shocked at once so as to hasten curing and preserve the quality of the seed. Threshing may be done with either the huller or the ordinary thresher. Often, thru lack of experience, a large part of the seed crop is lost in threshing. When a large crop is to be threshed it will pay to secure the services of a thresherman who has had experience along this line. Canvas laid on the bottom of the racks which haul the bundles to the machine will save much of the seed that would otherwise be lost.

HONEY

Sweet clover is regarded as one of the best plants for honey producing purposes. It has rather a long blooming season and the quality of the honey is very good. Many bee keepers sow sweet clover for honey purposes along the road sides in waste places. The period of nectar secretion usually follows that of white and alsike clovers and comes at a time when the colonies are strong enough to get the full benefit of the secretion. The honey from the white sweet clover is light in color with a slight green tint, the flavor being mild and suggestive of vanilla.[2]

VARIETIES OF SWEET CLOVER

Biennial White Blossom Sweet Clover. (Melilotus alba) A number of strains of biennial white sweet clover are known which do not differ botanically but which may differ considerably in growth habits. The white blossomed variety is most commonly grown and on the whole it appears to be the most

[1]For detailed plans as to how to construct and attach these pans, see U. S. Farmers Bulletin 836.

[2]Farmers Bulletin 820, "Sweet Clover Utilization."

satisfactory. It makes a vigorous growth and under average Nebraska conditions, produces a plant with a greater number of leaves and a larger root than the other varieties.

Biennial Yellow Blossom Sweet Clover. (Melilotus officinalis) Yellow blossom sweet clover also has a number of strains which differ to some extent in growth habits. The common yellow variety has a finer but more sparsely leafed

FIG. 4.—Sweet clover in Lancaster County seeded March 24 and ready for pasture June 1.

stem than the common white variety. The plants have a tendency to procumbence as contrasted to the more erect growth of the white. This variety is regarded by many to be especially good for pasture because of its less rank growth and ability to reseed itself when closely pastured. It is not likely that it produces the quantity of pasture, however, that is made by the white biennial variety. Yellow blossom sweet clover does not produce as large a root growth as the white variety and therefore adds less organic matter to the soil.

Annual Yellow Sweet Clover. (Melilotus indica.) This variety is not common in Nebraska and is of no particular economic importance. It is regarded as a weed in most parts of the United States, especially in the south and west, where it grows in grain fields. It is not recommended for Nebraska and care should be exercised in purchasing other sweet clover seed, as the seed of this variety is sometimes sold under the general name of sweet clover.

Annual White Sweet Clover. (Hubam) Annual white sweet clover, which has but recently come into prominence, resembles the biennial white variety but produces seed and dies the first year instead of the second. It is claimed by some that it makes a more rapid growth than the other sweet clovers and will make more hay and pasture the first year than the other varieties. Experience with it in Nebraska indicates that it is not superior to the ordinary white biennial even for the first year's growth. The latter makes an equally heavy growth and retains its foliage and succulence throughout the whole of the first year, while the annual goes to seed quickly, is more sparsely foliated, and rapidly becomes unpalatable on account of its woodiness. Its chief promise is as a soil building crop seeded alone or with small grain. It is regarded by beekeepers as a very good honey plant.

TIME OF SEEDING

Sweet clover may be seeded at almost any time during the year and a good stand secured, provided the weather and soil conditions are favorable. The most common time of seeding is in the early spring and on the whole this has given the best results. Sweet clover seeded the latter part of March or early in April, on a well prepared seed bed, has a chance to get ahead of the weeds thereby holding them in check, while at the same time it is enabled to get well rooted before the hot and dry weather and will thus stand drought much better. In the eastern part of the state sweet clover seeded alone in early spring is generally ready to pasture early in June. Farther west, where moisture conditions are not so favorable, the growth ordinarily will not justify pasturing until later in the season.

Winter seeding on winter wheat or rye or spring seeding with oats or barley is a quite common practice in eastern Nebraska. After the nurse crop is harvested the sweet clover can be used for pasture until frost or a crop of hay can be secured. Altho this method is quite successful in the ex-

treme eastern or northeastern part of the state, it is not generally successful farther west because of insufficient rainfall to support both the nurse crop and the clover and less favorable conditions at harvest time. Even at Lincoln seeding with a nurse crop fails about one-half of the time, on account of moisture shortages. In central Nebraska seeding alone in the spring or fall is generally satisfactory. If a nurse crop is used it should be reduced one-third to one-half in amount. Biennial sweet clover seeded in the fall will produce seed and die at the end of the following year as this completes its second year's growth. In western Nebraska sweet clover should be seeded alone either during the winter or early spring.

FIG. 5.—Second year sweet clover on the table land in Cheyenne County.

SEED BED PREPARATION

When seeding sweet clover on winter wheat or rye, no additional preparation is necessary. The seed is generally sown broadcast without covering, but may be covered by the roller or harrow. It is not generally a good practice to harrow winter grains in the spring after the frost has gone out as the plants at this time are easily dug out. The use of the roller is a much better practice as this will not only help to cover the seed but may also benefit the wheat by closing up the cracks and air spaces which have been formed by the frost.

The most common method of spring seeding either alone or with oats or barley is that of thoroly disking corn stalk ground and either drilling in the seed or sowing it broadcast and covering with the disk or harrow. This makes almost an ideal seed-bed if the ground has been kept comparatively free of weeds the previous season. Practically all of the small grains are used for a nurse crop,—barley and early oats being especially good. Late oats have a tendency to shade out the clover and are likely to give greater competition for moisture. When plowing ground for sweet clover care should be taken to thoroly pack the seed bed before the seed is sown; otherwise the furrow slice will quickly dry out and the clover will not do well unless there happens to be abundant rains. Land plowed shortly before seeding time should be plowed shallow and worked down as soon as possible. Following the plow with the harrow is a good practice. After harrowing, the use of the disk, float, or a packer should make a good seed-bed. The lack of a firm seed-bed has been the cause of more failures to get a stand than any other one cultural factor.

Winter or early spring seeding of sweet clover on old pastures to increase their carrying capacity is a quite common practice. Ordinarily the clover is drilled or sown broadcast and may be preceded or followed with a disk. The success or failure of this practice depends almost entirely on weather conditions, the thickness of the sod, and the amount of pasturing. When there is plenty of moisture it may be very successful but should it turn dry and the stock be allowed to graze on it the chances of success are very limited. However, many thin pastures have been greatly improved by this method. Such reseeded pastures should not be grazed too early or too close.

RATE AND METHOD OF SEEDING

The rate at which sweet clover should be seeded varies with the germination of the seed, the kind of seed, the condition of the seed-bed, and the method of seeding. Fifteen to twenty pounds of hulled seed are ordinarily used when seeding broadcast. This may be reduced to twelve pounds where the drill is used. When unhulled seed is used from five to ten pounds more should be sown per acre. The most common method of seeding is to sow broadcast and cover with the harrow. The seed is not all covered by this method and it is usually necessary to use more seed than when drilled. Drilling covers the seed more evenly and a more uniform stand is secured.

KIND OF SEED

Three kinds of clover seed,—the hulled, unhulled and scarified are on the market. Each kind gives good results if seeded at the right time of year. The unhulled seed is generally used for later fall or winter seeding, the hulled for winter or early spring seeding, and the scarified for spring or early fall seeding. The hulled and unhulled seed usually contains a large percentage of hard seed which must be scarified or subjected to freezing and thawing before they will germinate. So called "hard seed" absorb moisture very slowly and germination is therefore delayed. Scarified seed is that which has been run thru some contrivance which scratches the seed coat. This allows the seed to absorb water and to germinate more quickly. The action of frost on "hard seed" has the same effect as scarifying it. The ordinary farm feed grinder is sometimes used to take the hulls from the seed and it is found that this process will also scarify many of the seeds. It would not be as thoro, however, as a regular machine designed for this purpose. The increased age of the seed also reduces the per cent of "hard seed".

INOCULATION

Sweet clover is a legume similar to alfalfa, and depends, for successful growth, upon the presence of the proper bacteria in the soil. The same bacteria which form nodules on alfalfa roots are the proper ones for sweet clover. Wherever alfalfa is grown successfully without inoculation, sufficient bacteria will be present for the successful growth of sweet clover. A number of tests have been made with different inoculation material in various parts of the state. These have, in most cases, proved unbeneficial. If there is a question as to presence of the proper bacteria in the soil a small amount of the inoculation material should be used as a test. This material may be obtained from the U. S. Department of Agriculture, Washington, D. C. or from commercial firms who handle it. Soil from an old alfalfa or sweet clover field can also be used for this purpose. It can be spread with a manure spreader at the rate of about 300 to 400 pounds per acre. The land should be immediately harrowed in order to prevent the drying out of the applied soil. If commercial inoculating material is used, directions for its use will accompany it.

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